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ORIGINAL PAPER

Teens and the Misuse of Prescription Drugs: Evidence-Based Recommendations to Curb a Growing Societal Problem

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Abstract The misuse of prescription drugs by teens in the United States is a growing public health problem. This article provides a systematic synthesis of multiple strands of literature to recommend effective prevention methods. Using a social-ecological framework, we review the scope of the problem of prescription drug use among teens. Then, we analyze the multiple factors that may influence teen knowledge and attitudes toward prescription drugs and discuss the important challenges related to the construction of effective prevention programs. Finally, we provide recommendations for practice that attempt to overcome these challenges.

Keywords Prescription drug misuse · Teens · Recommendations for prevention

The misuse of prescription drugs by teens in the United States is a growing problem. Large-scale, national surveys of youth drug use, such as the *National Survey on Drug Use and Health (NSDUH)* (Substance Abuse and Mental Health Services Administration (SAMHSA) 2006a) and the *Monitoring the Future Study (MTF)* (Johnston et al. 2006), report such significant increases in nonmedical use of prescription drugs that the current generation of youth has been referred to as "Generation Rx" (Partnership for a Drug-Free America 2005). Although basic descriptive information is available on patterns of misuse among teens, there have been few systematic analyses of factors that may influence teens' knowledge about and attitudes towards prescription drugs—key factors for the creation of effective prevention programs. What is more, there has been limited application of the scant

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available information to the development and implementation of prevention programs to curb these increases. In this article, we aim to fill this information gap by connecting descriptive research on usage with extant literature on factors that may influence teens' knowledge and attitudes related to prescription drugs. Through these connections, we construct recommendations to curb the growing problem of prescription drug misuse by teens.

The analytic framework of this article is predicated on social ecological theory (Bronfenbrenner 1979), which provides a way to view the problem of prescription drug misuse contextually and environmentally. This theory suggests that a teen develops within different, interconnected environments, some of which are closer, or proximal, to the teen and others that are more remote, or distal. Each environment contains different influences: proximal environments include family and peer contexts, whereas distal environments include community, culture, and historical contexts. Multiple layers of influence from these different environments act in dynamic and reciprocal ways to shape knowledge, attitudes, and behavior during development. Understanding the multiple layers of influence and their environmental origins can help prevention programmers pinpoint credible message channels and intervention points to transmit accurate information about prescription drugs that will prevent their misuse. Such comprehensive approaches to prevention have been shown to be most successful (National Institute on Drug Abuse 2003).

From a practical perspective, knowledge and attitudes are strong predictors of behavior (Ajzen 1991), and the acquisition of accurate information and the development of protective attitudes are important components of substance use prevention (Fishbein and Middlestadt 1987). Therefore, exploring the myths and misconceptions of teens about prescription drugs may help prevention programmers develop new persuasive information on the topic. In turn, the dissemination of this information may prompt changes in knowledge, attitudes, and intentions among teens that may ultimately lead to a decrease in prescription drug misuse (Ajzen 1991).

The current article is organized as follows. First, we review the scope of the problem of prescription drug use among teens. Second, we analyze the multiple factors that may influence teen knowledge and attitudes toward prescription drugs. Third, we discuss the important challenges related to the construction of effective prevention programs. Finally, we supply recommendations for practice that attempt to address these challenges. On the whole, the article provides the first systematic examination of multiple strands of literature to construct methods that may curb prescription drug misuse among teens.

Scope of the Problem

One problem with crafting effective teen prescription drug prevention programs is the lack of consistent definitional language on the topic. Indeed, there is no standard definition in the field, but in this article we use the term "misuse" unless the cited literature uses different terminology. Following Boyd (Boyd et al. 2006a), we

defined prescription drug misuse as the nonmedical use of a prescription drug without a doctor's prescription. Moreover, the term "misuse" encompasses both self-medication (using the drug without a prescription to obtain the intended benefit of that drug) and recreational use (to get high or feel good).

Four factors help define the scope of the problem of prescription drug misuse: (a) how many teens are misusing prescription medication, (b) the extent to which usage varies across demographic groups, (c) misperceptions among teens about prescription drugs, and (d) the consequences of misusing prescription drugs. Each is discussed below.

Usage Patterns

According to SAMHSA (2004, 2006a), 9.1% of teens aged 12–17 misused prescription drugs in 2005, and prescription drugs are the most commonly abused drugs for 12–13 year-olds. More specifically, 7.4%, 2.2%, and 1.2% of youth ages 12–17 have misused a prescription pain reliever, prescription sedative or tranquilizer, or prescription stimulant, respectively. In 2006, there were as many new abusers of prescription drugs as new users of marijuana (SAMHSA 2006a).

Several types of prescription drugs are misused by teens. Pain relievers or opioids, such as Vicodin or Oxycontin, are the most frequently misused type of prescription drug. Other drugs that are used nonmedically include stimulants, such as methylphenidate (Ritalin), and tranquilizers, such as Valium and Xanax.

Results from the 2006 MTF survey show similar rates of use to those reported by NSDUH, with significant increases from 2000 to 2004. Use remains steady to date (Johnston et al. 2006). Trends from these national surveys indicate that, at the same time, teen use of all other drugs, such as marijuana, nicotine, and alcohol, decreased (Johnston et al. 2006).

Demographic Trends

Extrapolating from epidemiological data, a teen who misuses prescription drugs is more likely to be female, White, and in her late teens. Considering age alone, findings from the MTF survey indicate that usage rates rise consistently between 8th and 12th grade. Lifetime use of opioid prescription drugs is significantly higher among White 12th grade students (16.1%) than Hispanic (7.9%) or black (3.6%) students. The findings for sedative drugs also reflect this pattern: 11.8% of Caucasian, 9.4% of Hispanic and 3.3% of African American students in grade 12 report misuse of these drugs (Johnston et al. 2006). Other national and regional studies also found higher misuse rates for Caucasian students (see Boyd et al. 2006b; McCabe et al. 2007a; McCabe et al. 2004; SAMHSA 2004).

Among teens aged 12–17, females are somewhat more likely than males to misuse prescription drugs across all drug classes, including painkillers, stimulants and sedatives (SAMHSA 2004; Simoni-Wastila et al. 2004). Furthermore, girls have higher dependency and abuse rates of prescription drugs across all drug classes (SAMHSA 2006a).

Misperceptions About Prescription Drugs

Across demographic groups, there is evidence that teens underestimate the hazards of prescription drug abuse. For example, one-third of teens believe there is "nothing wrong" with using prescription medications for non-medical purposes occasionally (Partnership Attitude Tracking Survey (PATS) 2006). Furthermore, teens frequently characterize their misuse of prescription drugs as responsible, controlled, or safe (Friedman 2006). The 2005 PATS Study found that 40% of teens agree that prescription drugs are much safer to use than illegal drugs, even without a prescription (PATS 2006). Close to one-third of teenagers say that prescription painkillers are "not addictive" (PATS 2006).

Consequences of Prescription Drug Misuse

Despite these misconceptions, prescription drug misuse can have significant consequences, including addiction and physical risk. When first misuse of prescription drugs occurs before the age of 16, teens have a greater risk of dependence later in life (SAMHSA 2006a). In fact, the number of teens in treatment for addiction to prescription pain relievers has increased more than 300% over the last 10 years (SAMHSA 2006b). In 2004, nearly one in three teens in drug treatment programs were addicted to prescription drugs (SAMHSA 2006b).

The harmful physical effects of prescription drug misuse may include negative side effects and medical complications including death (NIDA 2005; Sussman et al. 2006). Indeed, across all age groups, emergency room visits involving misuse of prescription drugs increased 21% from 2004 to 2005 (Drug Abuse Warning Network (DAWN) 2007), and deaths due to opioid poisoning increased by 97% from 1997 to 2002 (Paulozzi 2006).

Influences on Knowledge and Attitudes About Prescription Drugs Among Teens

Increasing accurate knowledge about the risks of prescription drug misuse is likely to decrease misuse. In fact, there is an inverse relationship between level of perceived risk and likelihood of use when it comes to teenagers' willingness to misuse prescription drugs (Johnston et al. 2006). The MTF survey found, for example, that sedative use among 12th graders has increased in tandem with a decrease in the perceived risk of these drugs. In contrast, the increased peer-group disapproval of drugs such as marijuana is associated with a decreased use of these drugs.

There are myriad influences on teens' knowledge about and attitudes toward prescription drugs. Social-ecological theory provides a framework for understanding these forces, in that it suggests that environmental influences shape child development and come in two forms: proximal and distal.

Proximal Influences

In a social-ecological model, proximal influences are the developmental contexts that are closest to the teen and the mostly likely to directly impact development. These influences are divided into micro- and meso-systems. The microsystem is the internal state of the child and his or her close family and peers. The mesosystem includes connections between the influences of the microsystem (Bronfenbrenner 1979), such as conversations between child and parent about use of prescription drugs in the peer group. Figure 1 illustrates this concept.

Examining prescription drug misuse through this construct, proximal influences on teen knowledge and attitudes include the teen's own motivations for prescription drug misuse, messages received from parents and peers on this topic, and conversations between these groups about the topic. For example, teen motivations to misuse prescription drugs feature self-medication. Teenagers may use street drugs for recreational purposes, but they more often report use of prescription drugs for practical effects: hypnotic drugs for sleep, stimulants to enhance concentration and performance, and tranquilizers to decrease stress (Friedman 2006). McCabe et al.

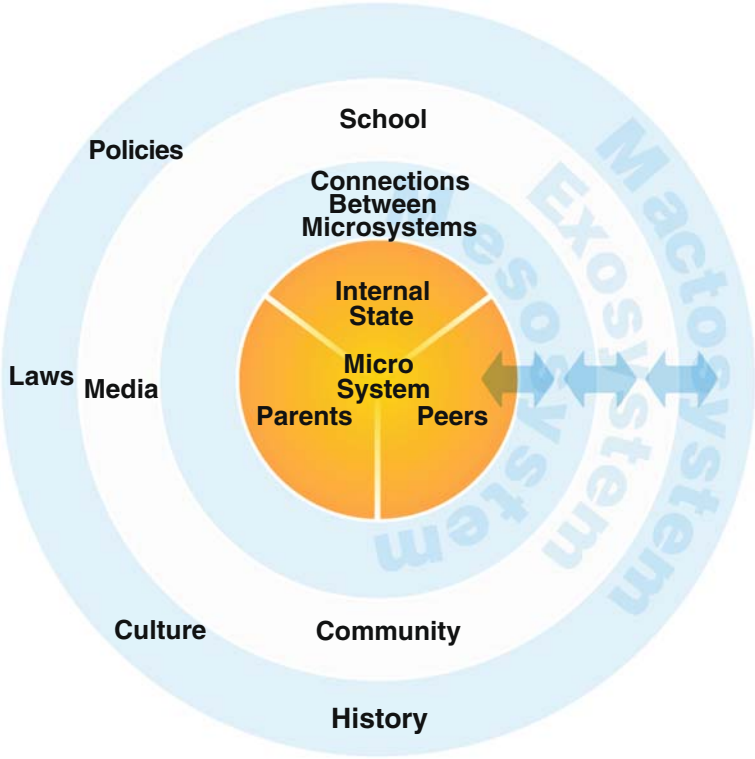

Fig. 1 Environmental influence on teen knowledge about and attitudes toward prescription drugs and their use and misuse. Proximal influences include the Mesosystem and Microsystem. Distal influences include the Macrosystem and Exosystem

(2007a, b) explored nonmedical use of prescription opioids in a sample of 4,580 undergraduate college students. Lifetime prevalence of nonmedical use was 14.3%, and past-year prevalence was 7.5%. Sixty-three percent of lifetime nonmedical users reported that "relieving pain" was the motivation for using. Other common motivations were to feel good or get high (31.9%) and experimentation (26.8%). Males were twice as likely as females to report using these drugs to get high. The risk of other drug use was highest for those individuals who reported "getting high" as their motivation for use. Existing addiction to the drug, and perceived safety of the drug were mentioned as motivations for use by fewer than 10% of the respondents (McCabe et al. 2007b).

In a related study of 9,161 undergraduate students, 8.1% reported illicit use of prescription stimulants in their lifetime, and 5.4% reported use in the past year (Teter et al. 2005). The three most common reasons given for nonmedical use of stimulant medications were to help with concentration (58%); increase alertness (43%); and get high (43%). More than half the respondents gave more than one motive for use.

Research from the MTF survey indicates that calming prescription drugs are becoming more popular, whereas stimulants are becoming less popular (Johnston et al. 2006). There is inadequate research to explain this trend, but some observers note that there is a desire among teenagers to feel at peace. For example, Friedman (2006) describes an e-mail he received from an Australian teenager that said, "We're living in a time that seems decidedly more apocalyptic, especially since 9/11 and all the recent natural disasters. Maybe we need something to slow down" (p. 1449). Although anecdotal, Friedman uses this quote to illustrate the sense of generational angst that might underpin changing patterns of substance abuse among some teens.

Teens' existing motivations to misuse prescription drugs may also be reinforced by overt and subtle messages from family members and friends. Indeed, teens may develop misconceptions about or risky attitudes toward prescription drugs through modeling by social networks and family members (Compton and Volkow 2006). Data collected by *Seventeen Magazine* indicate that 34% of teens said they feel "some pressure to use and/or misuse prescription drugs," whereas 9% said using/misusing prescription drugs is "an important part of fitting in with their friends" (Prescription drugs 2007).

Parental drug use can impact children through direct pathways, such as genetic susceptibility to addition, or indirectly, through exposure to models of drug use behavior (Compton and Volkow 2006). Although there is a paucity of literature on the relationship between these pathways and prescription drug misuse, youth who learn a lot at home about the risks of drugs in general are up to 50% less likely to abuse drugs than youth who do not have these conversations. However, parents are less likely to discuss prescription drug misuse than street drug abuse (PATS 2006). Whereas 60% of parents discuss drugs like marijuana "a lot" with their youth, only one-third of parents discuss the risks of prescription drug misuse (PATS 2006). This comparative lack of communication about prescription drugs may stem from parents' insufficient knowledge about the problem and the risks (McCabe and Boyd

2005) or their belief that these drugs are not as dangerous as street drugs (PDFA 2005).

Over 60% of teens report that prescription pain relievers are easy to get from parents' medicine cabinets, and when teens that have used prescription pain relievers are asked where they obtained the drugs, most report that they got them free from friends (SAMHSA 2006a). In fact, the sharing of prescription drugs frequently occurs among family members and friends (Daniel et al. 2003; National Center on Addiction and Substance Abuse 2005). Drug sharing may prompt teenagers to believe that self-medication without a prescription is normative and safe (Boyd et al. 2006a, b). Thus, parents and peers can influence knowledge about and attitudes toward prescription drug use while also providing drugs that enable the behavior.

Distal Influences

In a practical sense, the teen also lives within larger, nested, and distal environments, ranging from school to community to the larger culture and historical context in which the teen finds him- or her-self. In a social-ecological model, Bronfenbrenner (1979) divides the distal environment into the exosystem, which includes school, community and media influences, and the macrosystem, which includes culture and history. Figure 1 also illustrates the relationship between the teen and these systems.

Distal influences about prescription drugs are more subtle, diffuse, and unidirectional than proximal influences. For instance, teens may receive information from schools, the media, and society about prescription drugs but have little opportunity to influence, change, or interact with these messages. Further, messages from media and culture may be subtle and ubiquitous and are rarely supportive of prevention overall (Randolph and Viswanath 2004)

Distal influences may impact knowledge and attitudes two complementary ways. First, within these environmental settings, messages can influence a teen's knowledge, attitudes, and subsequent behavior. Second, messages from distal environments may also impact a teen's friends and family, and their interpretation of this information can in turn influence the teen.

The available literature suggests that some of the most notable source of messages about prescription drugs in recent years have originated in the macrosystem. These distal influences include an increase in the types of prescription drugs and the number of such prescriptions, direct-to-consumer marketing of prescription drugs, and the easy availability of prescription drugs on the Internet. These factors can be associated with two broad historical shifts related to prescription drugs: changes in the medical field and changes in the media.

Changes in the medical field related to prescription drugs

Two events in medical history—the establishment of pain management as a distinct discipline in the late 1980s and the launch of new pain medications in the early 1990s—significantly relate to increased supply and demand for prescription drugs (Sung et al. 2005). Indeed, from 1992 to 2002, the number of prescriptions filled for major prescription pain relievers increased dramatically. For example, prescriptions

for the pain relievers hydrocodone and oxydcodone increased 376% and 380%, respectively, during this time period. In contrast, prescriptions overall increased only 61% and the U.S. population grew only 12% (NCASA 2005). Prescriptions for other pain medications have shown similar increases (Compton and Volkow 2006). Although many of these prescriptions have, no doubt, resulted in the appropriate treatment of pain in people with chronic or acute conditions, it is unclear if the increase in prescription drug misuse is also related to the flood of these drugs in the market.

Changes in the media related to prescription drugs

In 1997, the Food and Drug Administration relaxed prohibitions against direct-to-consumer-advertising (DTCA) of prescription drugs, and it is now estimated that an average American sees as much as 16 h of prescription drug advertising on television per year (Brownfield et al. 2004). The frequency with which people are exposed to drug advertising impacts people's view of these drugs, as does the marketing message. In a content analysis of DTCA for prescription drugs, Frosch et al. (2007) found that 82% of ads used facts and rational arguments to promote the drug, but very few mentioned lifestyle changes that might replace or augment the drug. Emotional appeals were nearly universal in the ads analyzed (95%), and most ads indicated that use of the drug would result in more control over some aspect of life (85%) and be approved of by friends and family (78%). The authors caution that more oversight of DTCA for prescription drugs is needed because most ads provide only limited information about the causes of disease or who may be at risk.

Further, the scope of DTCA is substantial and growing. Using Nielsen data, Edwards (2007) estimates that total DTCA rose 14.1% to $4.7 billion in 2006, with most of the increased spending occurring on network television. DTCA also increased in print media, rising 24.7% to $1.8 billion in 2006.

The promotion of prescription drugs on the Internet also is growing. In monetary terms, Internet advertising constitutes a smaller category than television or print. Still, Edwards (2007) reports that $163 million was spent on Internet advertising for prescription drugs in 2006. A report from NCASA (2007) notes that another major source of information about prescription drugs on the Internet is online pharmacies. They found that 581 sites that advertise or sell controlled prescription drugs; 84% of the sites require no prescription. The most common drugs sold on these sites were anxiolytics, like Valium and Xanax, followed closely by the painkillers OxyContin and Vicodin. None of the sites had controls to prevent sales to children (NCASA 2007).

Promotional messages about prescription drugs in the media abound, and their abundance has been linked anecdotally, though not causally, with the increases in misuse of prescription drugs in recent years for two reasons. First, adolescents might perceive prescriptions drugs to be safer than illicit drugs largely because physicians prescribe them and because messages about them are widely available in the mainstream. Second, pharmaceutical advertisements and media portrayals of prescription drug use give teens the impression that use of these drugs is ubiquitous and routine (Friedman 2006; Kuehn 2007a, b). These misconceptions and attitudes

may then be reinforced by friends and family members who have been similarly influenced by media messages.

Challenges for Preventing Prescription Drug Misuse

Little is known about best practices for prevention of prescription drug use (Zacny et al. 2003), and more research is needed (Compton and Volkow 2006; Zacny et al. 2003). But such practices must be cast against the unique challenges to prescription drug misuse prevention that stem from three major sources: (a) the motivations teens report for misuse, (b) the normative influence of DCTA, and (c) the legitimate medical use of these drugs.

First, motivations for prescription drug misuse tend to contradict traditional ideas about adolescent drug use (Boyd et al. 2006a, b). The literature indicates that teens choose to misuse a prescription drug to obtain a specific pharmacological purpose—to treat pain, to relax or to perform better. Unlike other forms of adolescent drug use, the diffuse desire to feel good or get high ranks much lower as a motivation for prescription drug misuse. As a result, the prevention messages common to universal programs may not resonate with teens misusing prescription drugs. More research is needed on the progression of prescription drug misuse to understand how teens are introduced to and obtain the drug they ultimately misuse, how teens conceptualize misuse and associated risks and benefits, and what messages may change knowledge and attitudes in protective directions.

The second challenge to prevention is that DCTA may be creating a societal norm that prescription drugs are ubiquitous and universally beneficial. Subjective norms, or the belief that a behavior is desirable because it is common in the peer group, correlate closely with actual behavior (Fishbein and Middlestadt 1987). For that reason, normative education that corrects the misperception that "everyone" uses drugs is an important component of school-based drug use prevention programs (Ellickson et al. 2003; NIDA 2003). Therefore, prevention messages concerning prescription drug misuse should challenges the norms created by DCTA while being wary of unintended effects. To wit, messages must be carefully crafted to ensure that accurate information is provided without creating the false norm that most teens misuse prescription drugs or providing new information about which drugs teens can misuse.

A third challenge to prevention is the legitimate medical value of prescription drugs. Unlike street drugs, these pharmaceuticals have a vital role in reducing pain or treating serious medical conditions when used with a prescription and as directed. Prevention messages must strike a balance by correcting misperceptions that these drugs are without risk, while not stigmatizing legitimate use or those who use the drugs.

Recommendations for Prevention

Although there is limited direct evidence on effective approaches in curbing teen prescription drug misuse, the social-ecology framework and research on prevention

and science education suggest that efforts that address proximal influences may be beneficial. For example, drug prevention programs might consider the inclusion of outreach components for parents to ensure that they are aware of the risks of prescription drug misuse. Ideally, these programs would provide parents with concrete strategies and information on which they can base conversations with their teens. This approach is based squarely on the supply side and demand side influences that parents have on teen drug use. On the supply side, parents are a key and often unwitting source of prescription drugs for misuse (SAMHSA 2006a). On the demand side, many teens report that their parents have the greatest influence on their drug use attitudes and decisions (see NCASA 2002, for a review).

To address supply side parental considerations, prevention programs might include information on their role as gatekeepers of prescription drugs in the household and methods that parents may use to secure and monitor prescription drugs. On the demand side, because data suggest that parents are inadequately educated about the risks of prescription drug misuse (PATS 2006), prevention programs that help them to understand better the hazards posed by prescription drugs may be beneficial. To increase the probability of their effectiveness, prevention efforts should address the multiple motivations for prescription drug misuse among teens. These motivations may vary: some teens use prescription drugs to get high, some use them to self-regulate or self-medicate, and others may misuse their own prescription medication in hopes of enhancing its pharmacological benefits. Providing information to parents on the multiple reasons why teens to misuse prescription drugs may help them to combat the problem.

School-based programs may also have utility in decreasing prescription drug misuse. The literature indicates that teens have misconceptions about the relative safety of prescription drugs and choose to use them specifically to self-regulate and self-medicate. Therefore, school-based prevention that focuses on providing accurate information to teens about the risks associated with misuse of prevention drugs while overtly dispelling misconceptions, building anti-misuse norms, and fostering protective attitudes against misuse may be beneficial.

School-based prevention has declined (Orwin 2006), and this trend has been linked to recent policy changes, such as the implementation of No Child Left Behind and rigid standards of learning (Morse et al. 2004; National Education Association 2004). Therefore, prevention efforts must account for the effects of these policy changes. To that end, science education in classrooms as a specific form of school-based prevention may hold promise in the prevention of misuse. Science education differs from traditional prevention in two major ways. First, it is non-valenced and contains no overt messages against use. Second, it is often easier to integrate into a time-strapped and standards-constrained classroom than traditional school-based prevention. Science education has been shown to positively impact knowledge and attitudes of students on drugs of abuse (Holtz and Twombly 2007), likely because the information in science education programs is persuasive and increases knowledge about the risks of drugs (Johnston et al. 2006).

The unique characteristics of prescription drugs, including their legitimate medical use and the ubiquity of messages about them in today's society, may make science education potentially well suited to prevent their misuse. Indeed, there are

several reasons for practitioners to consider the integration of information about the science of prescription drugs' action into existing science or prevention curricula. First, accurate information may decrease myths and misconceptions about the safety of prescription drugs without increasing stigma for their legitimate medical use. Prevention messages for teens should emphasize that prescription drugs work by changing the functioning of the brain, and that for a person who needs the drug for a medical reason, this change may correct a deficit or imbalance. For an otherwise healthy brain, however, the brain changes caused by misuse of these drugs can be damaging, addicting or even life threatening. This information may be complemented with concrete, non-pharmacological strategies to increase coping and decrease stress among teens, particularly for those at risk for misuse of prescription drugs to self-medicate. Care would need to be taken to develop information for inclusion in science education curriculum that reinforces legitimate norms about the use of these drugs without increasing curiosity in high-sensation seekers (Everett and Palmgreen 1995).

Second, a well-designed and innovative science education curriculum may integrate involvement of key gatekeepers of prescription drugs, including physicians, pharmacists, parents, and teachers. Such programs should simultaneously educate these audiences about the risks of diversion and the importance of safeguarding prescriptions and encourage them to educate teens about the risks of prescription drug misuse.

Third, science education may be supplemented with media awareness training to help students analyze the presence and accuracy of media messages about prescription drugs in their environment. Public health media campaigns might also emphasize the importance of this issue and disseminate accurate information to parents, teens, and other community members on a wide scale.

Conclusion

To increase the likelihood of their effectiveness, prevention programs should target teens within their developmental context and address the multiple pro-drug influences with complementary anti-drug messages in order to build protective factors through all the contexts of development (Kumpfer and Turner 1990). For this reason, multi-component programs, such as parental and school-based, science educational approaches, may produce significant benefits. For example, a social marketing program recently launched in Massachusetts to prevent Oxycontin abuse, which includes complementary components for teens, parents, and clinicians, has shown preliminary success (Herr-Zaya et al. 2007). And even if a school does not have the resources to implement prevention or science education specifically on prescription drug abuse, universal prevention should still be considered because it shows promise to decrease the risk of drug use even for drugs not specifically named by the curriculum (Spoth et al. 2006).

Information sources about prescription drugs and their use and misuse are not one-dimensional. Teens are engaged in a dynamic process to create their knowledge and attitudes on this topic, fueled by information from multiple sources and

influencers. In turn, teens influence others, who may then decide whether to engage in misuse behaviors. Understanding the multiple sources of information—and their messages—can help prevention programmers intervene to reduce prescription drug misuse.

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